Gout severity, socioeconomic status and work absence: a cross-sectional study in primary care

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Objectives: To examine the association between gout severity and (i) socioeconomic status; (ii) work absence.

Methods: Postal questionnaires were sent to adults registered with 20 general practices who had consulted with gout or been prescribed allopurinol or colchicine in the preceding two years. Gout severity was defined using proxy measures: number of attacks, history of oligo/polyarticular attacks, disease duration, and allopurinol use. Socioeconomic status (SES) was defined using the English index of multiple deprivation (IMD) (area-level) using self-reported educational attainment (individual level). Work absence was defined as taking time off work in the past 6 months because of gout. Adjusted odds ratios (aOR, 95% confidence intervals) were calculated using logistic regression models (adjusted for age, gender, BMI, gout severity, co-morbidities).

Results: 1184 completed questionnaires were returned. Mean age was 65.6 years, 84% male. Not having attended further education was associated with having had ≥2 gout attacks in the last year (aOR 0.54; 0.36, 0.81) and oligo/polyarticular attacks (0.72; 0.50, 1.05). Lower area-level deprivation was associated with fewer attacks (aOR ≥2 attacks 0.71; 0.51, 0.98). Work absence was associated with having ≥2 attacks in the last year (2.91; 1.22, 6.92), oligo/polyarticular attacks (3.10; 1.46, 6.61) and shorter disease duration (>18 years: 0.13; 0.03, 0.50).

Conclusion: Gout severity was associated with individual level deprivation, countering the historical and unhelpful perception of gout as a "rich man's disease". The association of gout severity with work absence reinforces the argument for earlier urate-lowering therapy to prevent attacks from becoming frequent and debilitating.

Significance and Innovations

- Frequency of gout attacks was associated with both individual and area-level deprivation
- Two or more gout attacks in the last year was associated with a marked increase in work absence, suggesting a need for tighter control in primary care
- Disease duration was inversely correlated with work absence, suggesting patients may develop a better ability to cope over time

Gout is the most common inflammatory joint disease affecting men aged over 40 in the UK with a national prevalence of 2.5% in the adult population (1), a prevalence similar in other developed countries such as the US and New Zealand (2, 3). Gout is caused by hyperuricaemia, which reaches a threshold where monosodium urate (MSU) crystals form and are deposited in joints, most commonly within the 1st metatarsophalangeal joint (MTP) (4). In the UK, most people with gout are managed entirely in primary care.

It is important to understand the socioeconomic status (SES) of a community affected by a condition to ensure that care is distributed according to need. There are many studies of social deprivation and health outcomes, which show that being from a lower SES group is associated with increased GP attendance and poorer health (5, 6). Some of these studies (e.g. (6)), have been conducted at neighbourhood and individual levels, to try and tease out whether any association is due to community factors or factors pertaining more specifically to the patients. The few studies investigating the association between gout and SES provide contrasting results. In the UK, a recent study found that perceiving financial income to be inadequate was more common in people with gout aged 50 years and over compared with those without gout. However, no association was seen between the presence of gout and occupational class, educational attainment or area-level deprivation (7). Similarly, no association with area-level deprivation was found in Australia (8,9). A study from Western Germany reported an association between gout and SES in women but not men (10). Studies from England and New Zealand have shown that the prevalence of gout is highest in more socioeconomically deprived areas (4, 11). These existing studies have largely compared SES between people with and without gout. There are very few existing studies of the relationship between gout severity and SES. One study from Mexico did not find a relationship between the presence of tophi and either socioeconomic status or education level (12).

Due to the severity of acute gout, people are often unable to work, leading to short-term sick leave (13). The effect of gout on work ability, productivity, and employability has been shown to be a major concern of people with gout (14). Employees with gout have nearly five times more annual health-related absence

days than those without gout (15). The total annual employers' health benefit costs of an employee with gout in the USA has been shown to be almost twice that of an employee without gout ($6870 versus $3705) (16). Employees with gout who experience at least three gout attacks per year have more days of work absence than those having less frequent attacks (17). In a study of patients with severe chronic gout, refractory to conventional therapy (mean number of attacks 8.8 per year), 78% of those aged under 65 years of age reported being absent from work due to gout for at least 1 day in a one-year period and the mean annual number of work-days lost was 25 days (18). Work productivity has been shown to be impaired in those with inadequately-controlled gout despite urate-lowering therapy compared to those whose control was adequate (19). In contrast, one small study found no association between number of attacks or tophi and work productivity (20).

The aim of this study was to investigate the association between gout severity and 1) SES at the individual- and area-levels; and 2) work absence.

Patients and Methods

Study Population

The study used cross-sectional baseline data from a three-year primary care-based prospective observational study across 20 GP practices in the West Midlands, UK (21). Medical records were searched to identify patients older than 18 years who had a Read-coded consultation for gout or a prescription for allopurinol or colchicine in the preceding two years. Ethical approval was received from the North West – Liverpool East Research Ethics Committee (12/NW/0297).

Data collection

Potential participants were mailed by post a study pack, invitation to take part and a baseline survey questionnaire. Non-responders were mailed reminders two and four weeks after initial contact. Responders were asked to provide consent to review of their medical records.

Gout Severity measures

Gout severity was determined using proxy measures from the baseline questionnaire. As recommended by OMERACT (22), measures of gout severity included number of acute attacks experienced in the past year (categorised as no attacks, one attack or more than one attack) and presence of tophi (determined from primary care medical records in consenting participants). A history of oligo/polyarticular attacks (ever having an attack of gout affecting more than one joint at the same time), current use of allopurinol, and gout duration (participant's current age minus self-reported age at diagnosis, categorised into quartiles) were also included. These were considered to have face-validity as indicators of gout severity as the number of joints involved in attacks associates with poorer health-related quality of life (23), allopurinol prescription is more likely in people having frequent attacks or tophi (24), and people with longer disease duration have more frequent attacks (25-27).

Socioeconomic measures

Area-level deprivation was assessed using the English Indices of Multiple Deprivation (IMD) 2010 (28). The IMD divides the country into 32,482 lower-layer super-output areas (LSOAs) each with approximately 1500 people. These are assessed for deprivation across several domains (weighting): income deprivation (22.5%); employment deprivation (22.5%); health deprivation and disability (13.5%); education, training and skills deprivation (13.3%); barriers to housing and services (9.3%); crime (9.3%); and living environment deprivation (9.3%). IMD scores are then ranked, with 1 being the most deprived. For the purpose of this study, the rankings were divided into three tertiles: least deprived, mid-deprived and most deprived. In order to assess individual-level deprivation, participants were asked if they had gone on from school into full-time education or university (yes/no).

Work absence

Current employment was defined as either having a full-time or part-time job, or being employed but currently being off sick for six months or less (21). Participants were asked if they had taken time off work in the past six months because of gout.

Confounding factors

Age, gender, body mass index (BMI) (calculated from self-reported height and weight) and history of co-morbidities (diabetes, hypertension, stroke, transient ischaemic attack (TIA), hyperlipidaemia, kidney failure, kidney stones, angina and myocardial infarction) were obtained from questionnaire responses.

Analysis

Descriptive statistics were used to characterise the sample. Multilevel mixed-effects binary logistic regression models were used to assess the association between gout severity (attack frequency, history of oligo/polyarticular attacks, gout duration, current allopurinol use, tophi) and (i) further education and (ii) having had time off work because of gout. Multilevel mixed-effects ordinal logistic regression models were used to assess the association between gout severity and tertile of deprivation. The assumption of proportional odds in these models was assessed using a likelihood ratio test and a partial proportional odds model fitted as required. In all models, a random effect was estimated for general practice. Results are presented as unadjusted odds ratios (OR) with 95% confidence intervals (CI) and then adjusted for age, gender, BMI, other gout severity variables and co-morbidities. Analyses were conducted using SPSS (29) and Stata 14.2 (30).

Results

Sample characteristics

In total, 1184 people responded to the survey (adjusted response 66%), 1079 of whom provided consent for their medical records to be reviewed. As reported previously, responders tended to be older and were more likely to be male and live in less deprived areas than non-responders (31). Mean age was 65.6 (SD 12.5) years. The majority (83.6%) were male, Caucasian (97.6%) and had not attended further education (77.8%) (Table 1). Eight hundred and ninety-eight people (83.3%) were overweight or obese. Mean gout duration was 11.9 (SD 12.1) years, with 494 (44.0%) experiencing two or more attacks in the last year. Previous oligo/polyarticular attacks were reported by 436 (38.6%). Over half were currently using

allopurinol (630 (56.3%)) and 345 (32%) had a prescription for colchicine in the previous two years. Tophi were recorded in the medical record in the preceding two years for only 25 (2.4%). Of 394 who were currently employed, 75 (19.0%) reported having taken time off work in the last 6 months as a result of gout.

Socioeconomic deprivation

Attendance at further education was associated with approximately half the odds of having had two or more attacks in the last year (Table 2), an association which remained following adjustment for potential confounders (aOR 0.54 (95%CI 0.36, 0.81)). Those who attended further education also less frequently reported having had oligo/polyarticular attacks although this was not statistically significant (aOR = 0.72 (0.50, 1.05)). There were no significant associations between attendance at further education and disease duration, current allopurinol use or the presence of tophi (Table 2).

Greater area level deprivation (IMD) was associated with having two or more gout attacks in the last year (Table 3). This association remained after adjustment (aOR 0.71 (0.51, 0.98)). There were no significant associations between area-level deprivation and disease duration, history of oligo/polyarticular attacks, current allopurinol use or the presence of tophi. The assumption of proportional odds was met in all models.

Work absence

Amongst those in current employment (n=394), taking time off work in the last six months because of gout was significantly more likely in those who had had two or more attacks compared to a single attack in the last year (aOR = 2.91 (95%CI 1.22, 6.92)) (Table 4). Similarly, those who had a history of oligo/polyarticular attacks had over three times the odds of taking time off work (3.10 (1.46, 6.61)). In contrast, people who had longer gout duration were less likely to take time off work. No significant association found between time off work and current allopurinol use. The association between tophi and work absence was not examined because there were insufficient participants in current employment who had tophi.

Discussion

This study is the first to examine the association of gout severity with SES, providing unique data for clinicians and policy makers. Attendance at further education and area-level deprivation were associated with a lower frequency of attacks. Work absence because of gout was more common in those with frequent attacks and a history of oligo/polyarticular attacks but less common in those with longer duration of gout.

To our knowledge, only one previous study has examined the association between gout severity and SES, finding no statistically significant differences between those with severe and non-severe tophaceous gout (12). We found that non-attendance at further education was associated with more frequent attacks, a previous primary-care based study found that this did not differ between people with or without gout (7). This suggests that although the presence or absence of gout may not be influenced by educational attainment, level of education may be a risk factor for more severe gout. Although our data are cross-sectional, attending further education most commonly occurs early in life prior to the typical age of gout onset. In contrast, we found no association between educational attainment and oligo/polyarticular attacks, allopurinol usage, gout duration or tophi. Tophi are an infrequent finding in primary care gout populations and hence this finding may represent a type II error. The lack of association between allopurinol use and either measure of SES suggests that allopurinol prescription is not influenced by deprivation, although it remains possible that suboptimal titration of allopurinol is more common with greater deprivation, which might be suggested by the greater attack frequency in those not attending further education. We were unable to explore this possibility in this dataset. Our finding that the frequency of gout attacks was associated with greater area-level deprivation is consistent with studies from the UK and New Zealand (3, 11) which found that gout was more prevalent in areas of higher deprivation.

We found that work absence was more common amongst those with more frequent attacks or a history of oligo/polyarticular attacks. Previous studies have reported more work absence days in those with more frequent attacks (17, 18), presumably reflecting the severe pain and difficulty weight bearing associated with acute gout. These studies have not examined the association of work absence with a history oligo/polyarticular attacks. The finding that, amongst those in current employment, work absence was less likely in those with longer gout duration was unexpected. Our study cannot elucidate the reasons for this. However, it is plausible that people with longer duration of disease might be better able to reduce the impact of attacks (for example, by being better prepared to start treatment for attacks as soon as possible after onset) or could already have adjusted their working practices or changed their job to accommodate the unpredictability and debilitating nature of attacks.

The strengths of this study are the sample size and the primary care setting, maximising the generalisability of the results to the majority of patients with gout who are managed exclusively in primary care. Our choice of gout severity markers has not been validated as such, however, attacks and tophi have been highlighted as essential domains for chronic gout studies by OMERACT, and both attacks and the number of joints involved associate with poorer health-related quality of life (22, 23). Despite the large sample size, only a very small number had tophi documented in their medical records. Whilst this reflects the milder spectrum of disease seen in primary care, we were unable to examine the effect of tophaceous disease as a result. Comorbidities were ascertained by participant-report rather than from medical records because not all participants provided consent to record review. Although this could potentially introduce bias, the validity of self-reporting comorbidities has been previously shown (32, 33). A further limitation is that we included only a single measure of individual-level socioeconomic deprivation (education) and neglected to collect information on income, occupation, number of days lost from work, previous (rather than current) allopurinol use, or other gout treatments. Importantly, the diagnosis of gout in this study was based on a general practitioner's diagnosis of gout rather than crystal identification or gout classification criteria, risking misclassification bias. However, primary care coding of gout by general practitioners has been shown to have a high positive predictive value (34). Similarly, we

did not consider the value of SUA as a marker of gout severity or control, as this was only recorded in the medical records of 461 people (39% of the cohort).

Our finding that poor socioeconomic status was associated with more frequent attacks is contrary to the historical perception of gout as a rich man's disease (35). This is important as this stereotype, along with associated perceptions about gout being caused by dietary excess, may contribute to delayed consultation and reluctance to acknowledge having gout, particularly by women (36). Further research is needed to explore temporal aspects of the associations between gout severity and socioeconomic deprivation and work absence in longitudinal studies. The observation that work absence was less common in people with longer gout duration is worthy of further study as it may provide insights into how patients with gout manage both the disease and their work life in order to optimise their fitness to work. Our finding that both greater attack frequency and having oligo/polyarticular attacks was associated with work absence reinforces the case for treating people with urate-lowering therapy earlier in the course of the disease and suggests that work is an important outcome for future trials of interventions for gout.

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122.

Table 1: Participant characteristics (n = 1184)

Variable	n= 1184 (%)
Gender (n (%))	
Male	990 (83.6)
Female	194 (16.4)
Age, years (Mean (SD))	65.6 (12.5)
Ethnicity (n (%))	
White	1126 (97.6)
Non-white	28 (2.4)
BMI, Kg/m^2 (n (%))	
<25	221 (19.8)
25-29.9	511 (45.7)
30-34.9	260 (23.2)
≥35	127 (11.4)
Frequency of alcohol consumption	
Daily	273 (23.4)
3-4 times a week	263 (22.5)
1-2 a week	254 (21.8)
1-3 times a month	109 (9.3)
Special occasions	155 (13.3)
Never	113 (9.7)
Anxiety, GAD (n (%))	
None	844 (77.2)
Mild	141 (12.9)
Moderate	64 (5.9)

Severe	45 (4.1)
Depression, PHQ (n (%))	
None	763 (73.2)
Mild	148 (14.2)
Moderate	65 (6.2)
Moderately severe	40 (3.8)
Severe	26 (2.5)
Gout Characteristics	
Disease duration, years (mean, (SD))	11.9 (12.1)
Number of attacks in last 12 months	
0	398 (35.4)
1	231 (20.6)
≥2	494 (44.0)
Oligo/Polyarticular attacks	436 (38.6)
Current allopurinol use	630 (56.3)
Tophi	25 (2.4)
Socioeconomic indicators	
Attended higher education	
Yes	249 (22.3)
Neighbourhood deprivation, IMD (N (%))	
Most deprived	369 (31.2)
Mid-deprived	405 (34.21)
Least deprived	410 (34.6)
Work Disability	
Have you taken time off work during last 6 months because of gout? (n (%))	75 (19.1)

Table 2: Association between gout severity and attendance at higher education

Gout characteristics	Attended higher education		Odds ratio (95% confidence interval)	
	Attended higher education, n (%)	Did not attend higher education, n (%)		
Number of attacks in last 12 months			Unadjusted	Adjusted[a]
0	105 (43.2)	275 (33.4)	1	1
1	58 (23.9)	161 (19.5)	0.94 (0.65, 1.37)	0.93 (0.59, 1.46)
≥ 2	80 (32.9)	388 (47.1)	0.54 (0.39, 0.75)	0.54 (0.36, 0.81)
Disease duration (years)				
<2	62 (25.7)	222 (27.7)	1	1
3-8	58 (24.1)	207 (25.8)	1.01 (0.67, 1.51)	1.06 (0.66, 1.72)
8-18	63 (26.1)	183 (22.8)	1.24 (0.83, 1.86)	1.36 (0.82, 2.23)
≥19	58 (24.1)	190 (23.7)	1.09 (0.73, 1.65)	1.20 (0.70, 2.03)
Oligo/polyarticular attacks				
No	165 (67.1)	499 (60.3)	1	1
Yes	81 (32.9)	329 (39.7)	0.75 (0.55, 1.01)	0.72 (0.50, 1.05)
Current allopurinol use				
No	105 (43.6)	355 (43.3)	1	1
Yes	136 (56.4)	465 (56.7)	0.98 (0.74, 1.32)	0.82 (0.55, 1.21)
Tophi				
No	228 (99.1)	765 (97.2)	1	1
Yes	2 (0.9)	22 (2.8)	0.31 (0.07, 1.31)	0.38 (0.08, 1.73)

[a]adjusted for other variables in table, age, sex, BMI, comorbidities (diabetes, stroke, hypertension, TIA, hyperlipidaemia, kidney failure, heart attack, kidney stones, angina) and IMD tertile.

Table 3: Association between gout severity and IMD rankings divided into tertiles

Gout characteristics (OR (CI))	English Index of Multiple Deprivation (IMD) Most deprived, n (%)	Mid-deprived, n (%)	Least deprived, n (%)	OR (CI) of IMD	
Number of attacks in last 12 months				Unadjusted	Adjusted[a]
0	92 (26.7)	154 (39.6)	152 (39.1)	1	1
1	66 (19.1)	79 (20.3)	86 (22.1)	0.85 (0.62, 1.16)	1.01 (0.69, 1.49)
≥ 2	187 (54.2)	156 (40.1)	151 (38.8)	0.68 (0.52, 0.88)	0.71 (0.51, 0.98)
Disease duration (years)					
<2	93 (27.7)	112 (29.6)	97 (25.3)	1	1
2-8	92 (27.4)	84 (22.2)	97 25.3)	1.06 (0.77, 1.47)	1.04 (0.71, 1.52)
8-18	73 (21.7)	85 (22.4)	99 (25.9)	1.41 (1.01, 1.97)	1.26 (0.84, 1.89)
>18	78 (23.2)	98 (25.9)	90 (23.5)	1.05 (0.76, 1.45)	0.94 (0.62, 1.43)
Oligo/polyarticular attacks					
No	194 (26.1)	251 (63.7)	250 (63.9)	1	1
Yes	152 (43.9)	143 (36.3)	141 (36.1)	0.85 (0.67, 1.07)	1.11 (0.82, 1.48)
Current allopurinol use					
No	156 (45.4)	160 (41.2)	174 (44.9)	1	1
Yes	188 (54.7)	228 (58.8)	214 (55.2)	1.02 (0.81, 1.29)	1.03 (0.75, 1.40)
Tophi					
No	318 (97.9)	359 (97.3)	361 (97.8)	1	1

Yes	7 (2.2)	10 (2.7)	8 (2.2)	0.94 (0.44, 2.01)	1.25 (0.53 ,2.97)

[a]adjusted for other variables in table, age, sex, BMI, comorbidities (diabetes, stroke, hypertension, TIA, hyperlipidaemia, kidney failure, heart attack, kidney stones, angina) and further education status

Table 4: Work disability as related to gout severity (n=394)

	Have you taken time off work during last 6 months because of gout?			
Gout characteristics	Time off, n (%)	No time off, n (%)	OR (CI) of having taken time off work	
Number of attacks in last 12 months[b]			Unadjusted	Adjusted[a]
1	9 (12.9)	63 (35.0)	1	1
≥2	61 (87.1)	117 (65.0)	3.65 (1.70, 7.83)	2.91 (1.22, 6.92)
Disease duration (years)				
<2	30 (41.7)	81 (26.9)	1	1
2-8	21 (29.2)	79 (26.3)	0.72 (0.38, 1.38)	0.52 (0.22, 1.26)
8-18	16 (22.2)	71 (23.6)	0.62 (0.31, 1.25)	0.31 (0.11, 0.85)
>18	5 (6.9)	70 (23.3)	0.19 (0.07, 0.52)	0.13 (0.03, 0.50)
Oligo/polyarticular attacks				
No	32 (43.8)	191 (62.6)	1	1
Yes	41 (56.2)	114 (37.4)	2.21 (1.30, 3.74)	3.10 (1.46, 6.61)
Current allopurinol use				
No	36 (50.0)	132 (44.2)	1	1
Yes	36 (50.0)	167 (55.9)	0.79 (0.47, 1.32)	1.99 (0.94, 4.23)

[a]adjusted for number of attacks, disease duration quartiles, poly-oligoarticular attacks, current allopurinol use, age, sex, BMI and comorbidities (diabetes, stroke, hypertension, TIA, hyperlipidaemia, kidney failure, heart attack, kidney stones, angina)

[b]Analysis restricted to those reporting ≥1 attack in last 12 months (n=270)